

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-287941  
(43)Date of publication of application : 01.11.1996

(51)Int.Cl.

H01M 10/02

(21)Application number : 07-112513  
(22)Date of filing : 13.04.1995

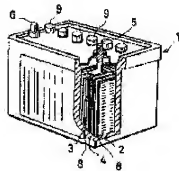
(71)Applicant : TAKAHASHI HIDEYORI  
(72)Inventor : TAKAHASHI HIDEYORI

(54) BATTERY

(57)Abstract:

PURPOSE: To quickly remove bubbles which are generated at charging time and stick to electrode plates.

CONSTITUTION: Vibrating means 8 are arranged to vibrate a positive electrode plate 2 and a negative electrode plate 3, and a drive current is supplied to the vibrating means 8 at charging time, and these are vibrated in a prescribed frequency. The respective electrode plates 2 and 3 are vibrated by this vibration, and bubbles which are generated at charging time and sticking to surfaces of the respective electrode plates 2 and 3 are removed, and the surfaces of the respective electrode plates 2 and 3 are brought into contact with electrolyte 7 over the whole surface, and electric resistance at charging time is reduced, and a charging current is sufficiently flowed, and charging time can be shortened.



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Translated: 23:03:49 JST 08/08/2008

Dictionary: Last updated 08/08/2008 / Priority: 1. Mechanical engineering / 2. Chemistry

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**CLAIM + DETAILED DESCRIPTION**

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**[Claim(s)]**

[Claim 1] The dc-battery characterized by establishing an oscillating means to vibrate the above-mentioned positive plate and a negative plate, in the dc-battery which a positive plate and a negative plate are made to counter into an electrolyte, and is arranged.

[Claim 2] The above-mentioned oscillating means is a dc-battery according to claim 1 characterized by being laid underground in the above-mentioned positive plate and a negative plate, and being prepared.

[Claim 3] The above-mentioned oscillating means is a dc-battery according to claim 1 characterized by being attached in dc-battery casing by which the above-mentioned positive plate and the negative plate are stored.

[Claim 4] The above-mentioned oscillating means is a dc-battery according to claim 1 characterized by being attached to the exterior of dc-battery casing the above-mentioned positive plate and the negative plate are stored.

[Claim 5] In the dc-battery which a positive plate and a negative plate are made to counter into an electrolyte, and is arranged An oscillating means to vibrate the above-mentioned positive plate and a negative plate, and an actuation current feed means to supply an actuation current to the above-mentioned oscillating means, The dc-battery characterized by establishing a charging-current detection means to make it operate the above-mentioned actuation current feed means automatically when the charging current sent by the above-mentioned positive plate and the negative plate is detected and charge is started.

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] Especially this invention is used for the dc-battery which dipped and constituted the positive plate and the negative plate in the electrolyte with respect to a dc-battery, and is suitable.

**[0002]**

[Description of the Prior Art] As everyone knows, although the dc-battery (storage battery) is used in the various industrial fields, it uses for an automobile as the typical thing, and the dc-battery for \*\*\*\* automobiles is known.

[0003] The above-mentioned dc-battery for automobiles is carried without asking a gasoline vehicle and a diesel engine vehicle, and is used as a power source of engine start up, firing, Lighting Sub-Division, and other electronic autoparts. By the way, the dc-battery for automobiles currently used is also called lead accumulator from the place whose active substance is lead. [ present most ]

[0004] The above-mentioned lead accumulator dips and constitutes these electrode plates and separators in the electrolyte which consists of dilute sulfuric acid while insulating on both sides of a separator between the electrode plates of two sheets which consist of a lead plate.

[0005] Thus, if a load is connected between an anode electrode plate and a cathode electrode plate, the constituted lead accumulator can take out now the chemical energy which the active substance and electrolyte of each electrode plate have as electric energy, and can send the current of a predetermined electrical potential difference through the above-mentioned load.

[0006] Moreover, if a battery charger is connected between an anode electrode plate and a cathode electrode plate and electric energy is given to it from the exterior contrary to the above, it has the invertibility which can return again the active substance of the above-mentioned anode electrode plate and a cathode electrode plate to the original active substance with chemical energy. Therefore, since the electric energy for picking to have

taken [ above-mentioned ] out can be filled up by charge while taking out electric energy if needed in the case of a dc-battery, it becomes possible to use it repeatedly.

[0007]

[Problem to be solved by the invention] In the dc-battery constituted as mentioned above, if electric energy is given and it charges, the mixed gas of hydrogen gas and oxygen gas occurs with charge, and the mixed gas which occurred [ above-mentioned ] will serve as blowhole, and will adhere to an electrode plate.

[0008] When the blowhole of the above-mentioned mixed gas adheres, it becomes impossible to carry out direct contact of the electrode plate of the part to an electrolyte. And since the blowhole by the mixed gas of the above-mentioned hydrogen gas and oxygen gas hardly conducts a current, while electric resistance's increasing and becoming difficult to flow through a current, as for the electrode plate part to which blowhole has adhered, a charging effect will almost be performed.

[0009] This invention aims at enabling it to remove promptly the blowhole which is generated at the time of charge and adheres to an electrode plate in view of an above-mentioned trouble.

[0010]

[Means for solving problem] The dc-battery of this invention is a dc-battery characterized by establishing an oscillating means to vibrate the above-mentioned positive plate and a negative plate in the dc-battery which a positive plate and a negative plate are made to counter into an electrolyte, and is arranged.

[0011] Moreover, the place by which it is characterized [ of this invention / other ] is characterized by laying the above-mentioned oscillating means underground in the above-mentioned positive plate and a negative plate, and establishing it.

[0012] Moreover, the place by which it is characterized [ of others of this design ] is characterized by attaching the above-mentioned oscillating means in dc-battery casing by which the above-mentioned positive plate and the negative plate are stored.

[0013] Moreover, the place by which it is characterized [ of others of this design ] is characterized by attaching the above-mentioned oscillating means to the exterior of dc-battery casing the above-mentioned positive plate and the negative plate are stored.

[0014] [ moreover, the place by which it is characterized / of others of this design ] In the dc-battery which a positive plate and a negative plate are made to counter into an electrolyte, and is arranged An oscillating means to vibrate the above-mentioned positive plate and a negative plate, and an actuation current feed means to supply an actuation current to the above-mentioned oscillating means, When the charging current sent by the above-mentioned positive plate and the negative plate is detected and charge is started, it is characterized by establishing a charging-current detection means to make it operate the above-mentioned actuation current feed means automatically.

[0015]

[Function] Since the above-mentioned oscillating means will vibrate on a predetermined frequency if an actuation current is supplied at the time of charge, since this invention consists of the above-mentioned technical means, each electrode plate will vibrate by the above-mentioned oscillation. The blowhole which was generated at the time of charge and has adhered to the surface of each electrode plate by this will be removed, and the surface of each electrode plate can contact an electrolyte now extensively. Therefore, since the surface of an electrode plate can be extensively contacted to an electrolyte while being able to reduce the electric resistance at the time of charge, a charging effect can be performed good.

[0016] Moreover, since according to other descriptions of this invention a charging-current detection means will detect it and an actuation current feed means will be automatically operated if charge is started, when charging, the time and effort which sends an actuation current through a diaphragm as it is also with hand control can be omitted.

[0017]

[Working example] Next, one work example of the charging equipment of the dc-battery of this invention is explained in full detail, referring to an accompanying drawing. Drawing 1 is the perspective view showing the appearance of the dc-battery of this invention.

[0018] As shown in drawing 1 , six unit batteries are formed in the core of the dc-battery casing 1, and this dc-battery is constituted so that the electrical potential difference of 12V may be obtained as a whole.

[0019] While the positive plate 2 and the negative plate 3 are formed, respectively, the separator (separator) 4 is arranged between the above-mentioned positive plate 2 and the negative plate 3 by each unit battery, and the above-mentioned positive plate 2 and the negative plate 3 are insulated by the above-mentioned separator 4.

[0020] It connects with the terminal 5 for anodes and the terminal 6 for cathodes which are established in the top face of the above-mentioned dc-battery casing 1 electrically, and these positive plates 2 and negative plates 3 are connected to an external load and an external battery charger through the above-mentioned terminal 5 for anodes, and the terminal 6 for cathodes.

[0021] Moreover, inside the above-mentioned dc-battery casing 1, it is put into the electrolyte 7, and the above-mentioned positive plate 2, the negative plate 3, and the separator 4 are arranged in the core of the above-mentioned dc-battery casing 1 in the condition of having flooded with the above-mentioned electrolyte 7. In addition, the vent plug 9 for filling up an electrolyte 7 is formed in each unit battery, respectively.

[0022] The above-mentioned architecture is the general architecture of a dc-battery, and the dc-battery of this invention is arranging the diaphragm 8 in the core of a positive plate 2 and a negative plate 3, as shown in [drawing 2](#) in detail. The above-mentioned diaphragm 8 is constituted by the ceramic piezoelectric element which will vibrate if a volts alternating current is impressed, and is made as [ vibrate / by the oscillation / the above-mentioned positive plate 2 and a negative plate 3 ].

[0023] Next, the action of the dc-battery of this example constituted as mentioned above is explained. If a load 10 is connected between the terminal 5 for anodes, and the terminal 6 for cathodes as shown in [drawing 3](#) , the discharge current S1 of the magnitude according to a load 10 will come to flow.

[0024] If the above-mentioned discharge current S1 flows, it will combine with a part for the sulfuric acid in an electrolyte 7, and a positive plate 2 and a negative plate 3 will change to lead sulfate. Moreover, since it combines with the oxygen of an anode active substance and the hydrogen of the sulfuric acid in an electrolyte 7 serves as water, the concentration of an electrolyte 7 falls.

[0025] Moreover, if a battery charger 11 is connected between the terminal 5 for anodes, and the terminal 6 for cathodes, the charging current S2 of the magnitude according to a battery charger 11 will come to flow. Since the above-mentioned charging current S2 flows into a reverse direction with discharge current S1, the lead sulfate formed in the positive plate 2 and the negative plate 3 in this case turns into lead peroxide, and a part for sulfuric acid will be returned to an electrolyte 7.

[0026] Therefore, if it charges, while returning to the condition before the active substance of a positive plate 2 and a negative plate 3 discharging, by discharge, the sulfuric acid concentration of the electrolyte 7 which became thin becomes deep, and will return to the condition before a chemical component discharging.

[0027] If it charges by sending the charging current S2 as mentioned above, the mixed gas of hydrogen gas and oxygen gas occurs briskly, and this will serve as blowhole 12 and will adhere to the surface of a positive plate 2 and a negative plate 3.

[0028] When the above-mentioned blowhole 12 adheres, it becomes impossible to carry out direct contact of the surface of a positive plate 2 and a negative plate 3 to an electrolyte 7. Moreover, since electric resistance increases while the acreage which carries out a chemical reaction will decrease if blowhole 12 adheres since the above-mentioned blowhole 12 does not conduct a current, a charging effect fully ceases to be acquired.

[0029] If charge is started in the case of the dc-battery of this example and the charging current S2 is detected to it in order to prevent such inconvenience, he is trying to supply the actuation current S3 to the above-mentioned diaphragm 8.

[0030] If the above-mentioned actuation current S3 is sent, a diaphragm 8 will start an oscillation as it is also at the frequency according to the frequency of the above-mentioned actuation current S3. Since the above-mentioned positive plate 2 and a negative plate 3 vibrate when this oscillation is transmitted, it becomes impossible for blowhole 12 to have adhered to the surface of these electrode plates 2 and 3.

[0031] Since the acreage which carries out direct contact to an electrolyte 7 will increase a positive plate 2 and a negative plate 3 if the blowhole 12 adhering to the surface is lost, electric resistance decreases and the charging effect between the above-mentioned positive plate 2 and a negative plate 3, and an electrolyte 7 increases quickly.

[0032] Since the example shown in [drawing 3](#) and [drawing 4](#) formed the diaphragm 8 in each electrode plate 2 and 3, it can vibrate these electrode plates 2 and 3 directly. Therefore, blowhole 12 can be removed good with vibrational energy small in this case.

[0033] However, this invention can be prepared in various locality, without forming a diaphragm 8 in each electrode plate 2 and 3 in this way. For example, you may make it attach to the bottom inside the dc-battery casing 1, as shown in the sectional view of [drawing 5](#) . In addition, it is good to cover a diaphragm 8 with the coat material 13 in this case.

[0034] Moreover, you may make it attach a diaphragm 8 to the exterior of the dc-battery casing 1, as shown in the sectional view of [drawing 6](#) . In this case, you may attach to the bottom of the dc-battery casing 1, and may

make it attach to the side face of right and left of the dc-battery casing 1.

[0035] Although you may make it supply manually, you may constitute the above-mentioned actuation current S3 so that the charging current S2 may be detected and it may supply automatically. For example, as shown in the functional constitution figure of drawing 7, the charging-current detection means 14 and the actuation current feed means 15 are established, and the charging current S2 supplied to each electrode plates 2 and 3 is detected from a battery charger 11.

[0036] And if the above-mentioned charging-current detection means 14 detects the charging current S2, the detection signal S4 will be derived for the actuation current feed means 15. If the detection signal S4 is given, the actuation current feed means 15 outputs the actuation current S3 to a diaphragm 8, and it is made to vibrate a diaphragm 8.

[0037] Although the alternating-current current of arbitrary frequencies is sufficient, since it is noisy in case of an audiofrequency strap, it is made an ultrasonic strap, or the above-mentioned actuation current S3 is 20. It is good to make it the following frequency bands. Although the dc-battery of this invention constituted as mentioned above can be used for various applications, if a high current is especially used for the dc-battery for electric motorcars which needs to carry out charge and discharge, it can demonstrate the effectiveness of this invention further, and it is \*\*.

[0038] Then, another example is shown in drawing 8. This example puts in water 21 into a tub 20, puts in the dc-battery casing 1 into water 21, and forms the ultrasonic vibration plate 8 in the base of a tub 20. The dc-battery casing 1 is held in a tub 20 by a base material 22. A supersonic wave is transmitted into water 21 by oscillation of the ultrasonic vibration plate 8, and the dc-battery casing 1 is vibrated, and a positive plate and a negative plate are vibrated. The blowhole which adheres to each electrode plate by this is removed, and charge time can be shortened substantially.

[0039]

[Effect of the Invention] Since an oscillating means to vibrate a positive plate and a negative plate was established as this invention was mentioned above, by supplying an actuation current to the above-mentioned oscillating means at the time of charge, it can be made to be able to vibrate on a predetermined frequency and each electrode plate can be vibrated. The blowhole which was generated at the time of charge and has adhered to the surface of each electrode plate by this can be removed, and the surface of each electrode plate can be extensively contacted to an electrolyte. Therefore, the electric resistance at the time of charge can be reduced, a charging current can fully be sent, and charge time can be shortened substantially.

[0040] Moreover, since a charging-current detection means to have detected the charging current sent by a positive plate and the negative plate, and to operate an actuation current feed means automatically was established according to other descriptions of this invention When charge is started, and the above-mentioned actuation current feed means can be operated automatically and it charges, the time and effort which sends an actuation current through a diaphragm as it is also with hand control can be omitted, and the blowhole which is generated at the time of charge and adheres to the surface of each above-mentioned electrode plate can be removed easily and certainly.

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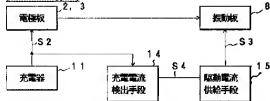
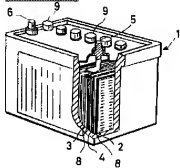
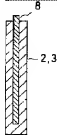
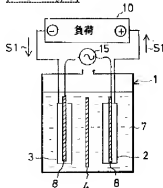
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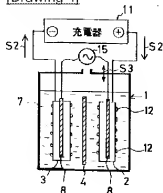
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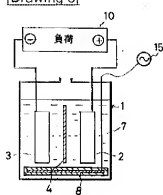
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**DRAWINGS****[Drawing 7]****[Drawing 1]****[Drawing 2]****[Drawing 3]**

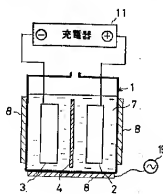
[Drawing 4]



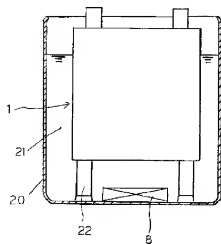
[Drawing 5]



[Drawing 6]



[Drawing 8]



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